

[0203] Referring to FIG. 13A, when first photographing corresponding to the external object is performed, the electronic device may obtain a first image 1311 having first color information 1321, as illustrated in FIG. 13B, from pixels 1301. The electronic device may move the lens or the image sensor, by using the actuator, in the 9 o'clock direction and the 6 o'clock direction, based on a 1-pixel unit.

[0204] When second photographing corresponding to the external object is performed based on the pixel movement, the electronic device may obtain a second image 1313 having second color information 1323, as illustrated in FIG. 13C, from pixels 1303.

[0205] The W(0,0) color information of the first image 1311 is located in a location corresponding to the G'(-1,-1) color information of the second image 1313, and the electronic device (e.g., an image processing module thereof) may perform processing by replacing the W(0,0) color information with the G'(-1,-1) color information or combining the W(0,0) color information and the G'(-1,-1) color information. For example, the electronic device may generate a third image 1335 having third color information 1337, as illustrated in FIG. 13F.

[0206] FIGS. 14A to 14F illustrate an operational method of an electronic device according to an embodiment of the present disclosure.

[0207] Referring to FIG. 14A, when first photographing corresponding to the external object is performed, the electronic device may obtain a first image 1411 having first color information 1421, as illustrated in FIG. 14B, from pixels 1401. The electronic device may move the lens or the image sensor, by using the actuator, in the 3 o'clock direction and the 12 o'clock direction, based on a 1-pixel unit.

[0208] When second photographing corresponding to the external object is performed based on the pixel movement, the electronic device may obtain a second image 1413 having second color information 1423, as illustrated in FIG. 14C, from pixels 1403.

[0209] The W(0,0) color information of the first image 1411 is located in a location corresponding to the G'(1,1) color information of the second image 1413, and the electronic device (e.g., an image processing module thereof) may perform processing by replacing the W(0,0) color information with the G'(1,1) color information or combining the W(0,0) color information and the G'(1,1) color information. For example, the electronic device may generate a third image 1435 having third color information 1437, as illustrated in FIG. 14F.

[0210] FIGS. 15A to 15F illustrate an operational method of an electronic device according to an embodiment of the present disclosure.

[0211] Referring to FIG. 15A, when the electronic device performs first photographing corresponding to the external object, the electronic device may obtain a first image 1511 having first color information 1521, as illustrated in FIG. 15B, from pixels 1501. The electronic device may move the lens or the image sensor, by using the actuator, in the 9 o'clock direction and the 12 o'clock direction, based on a 1-pixel unit.

[0212] When second photographing corresponding to the external object is performed based on the pixel movement, the electronic device may obtain a second image 1513 having second color information 1523, as illustrated in FIG. 15C, from pixels 1503.

[0213] The W(0,0) color information of the first image 1511 is located in a location corresponding to the G'(-1,1) color information of the second image 1513, and the electronic device (e.g., an image processing module thereof) may perform processing by replacing the W(0,0) color information with the G'(-1,1) color information or combining the W(0,0) color information and the G'(-1,1) color information. For example, the electronic device may generate a third image 1535 having third color information 1537, as illustrated in FIG. 15F.

[0214] FIGS. 16 to 16D illustrate an operational method of an electronic device according to an embodiment of the present disclosure.

[0215] Referring to FIG. 16A, a pixel array, which may be included in an image sensor, includes an RGBW pixel unit 1611. Specifically, the pixel array includes multiple RGBW pixel units 1611, each including one R pixel, two G pixels, one B pixel and four W pixels.

[0216] When first photographing corresponding to the external object is performed, the electronic device may obtain a first image 1631 having first color information 1635, as illustrated in FIG. 16B, from pixels 1621. The electronic device may move the lens or the image sensor in the 3 o'clock direction by one pixel, by using the actuator.

[0217] When second photographing corresponding to the external object is performed based on the pixel movement, the electronic device may obtain a second image 1633 having second color information 1637, as illustrated in FIG. 16C, from pixels 1623.

[0218] The first color information 1635 includes W(-1,1) color information corresponding to W(-1,1) pixel, W(0,0) color information corresponding to W(0,0) pixel, W(-1,-1) color information corresponding to W(-1,-1) pixel, and W(0,-2) color information corresponding to W(0,-2) pixel.

[0219] The W(-1,1) color information, the W(0,0) color information, the W(-1,-1) color information, and W(0,-2) color information of the first color information 1635 associated with the first image 1631 may correspond to G'(0,1) color information, B'(1,0) color information, G'(0,-1) color information, and R'(1,-2) color information of the second color information 1637 associated with the second image 1633, respectively. Accordingly, as illustrated in FIG. 16D, an image processing module may perform processing by replacing or combining W(-1,1) color information with G'(0,1) color information, W(0,0) color information with B'(1,0) color information, W(-1,-1) color information with G'(0,-1) color information, and W(0,-2) color information with R'(1,-2) color information, respectively. For example, the image processing module may generate a third image 1651 by generating third color information 1641 including color information of an RGB Bayer pattern.

[0220] FIGS. 17A to 17D illustrate an operational method of an electronic device according to an embodiment of the present disclosure.

[0221] Referring to FIG. 17A, when first photographing corresponding to the external object is performed, the electronic device may obtain a first image 1731 having first color information 1735, as illustrated in FIG. 17B, from pixels 1721. The electronic device may move the lens or the image sensor in the 9 o'clock direction by one pixel, by using the actuator.

[0222] When second photographing corresponding to the external object is performed based on the pixel movement,